Literacy in Science

ITTECF – Standard 3 – Demonstrate good subject and curriculum knowledge

Literacy is for everyone

“Every teacher can improve pupils’ communication and literacy, including by explicitly teaching reading, writing and oral language skills specific to individual disciplines.”

Initial Teacher Training and Early Career Framework

Core components of science literacy: **Vocabulary**

- Photosynthesis
- Intestines
- Nucleus
- Power
- Force
- Accuracy
- Precision
- Evaporation
- Precipitation
- Adaptation
- Ventricle
- Capillary
- Exothermic
- Beryllium

Science vocabulary can feel like learning a new language! Many words are subject-specific or have double meanings in everyday use.

Core components of science literacy: **Vocabulary**

Scientific language often includes technical, abstract, and unfamiliar words, making explicit vocabulary instruction vital.

Teach and reinforce key vocabulary, focusing on challenging words and their roots.

Subject specific vocabulary is available on exam board websites.

Support:

Developing language and literacy in science | National Literacy Trust

Core components of science literacy:
Reading

Comprehension strategies for science texts (e.g. directed activities related to text, reciprocal reading) improve understanding and support curriculum access.

Use activities like DARTS (Directed Activities Related to Text) and reciprocal reading to support close reading of science texts.

Reciprocal reading: Example from science

Reciprocal reading task: agriculture and ammonia | 14–16 years | Resource | RSC Education

Look at this resource and **evaluate** it's use as a literacy activity.

DARTS

Separating caffeine | 11–14 years | Resource | RSC Education

Try this activity. **Compare** it to the reading activity in terms of effectiveness as a literacy activity.

Core components of science literacy:
Writing

Students need to learn how to write investigations, reports, and explanations using appropriate scientific forms and conventions.

Model and scaffold writing tasks - such as scientific reports, explanations, and conclusions.

Feedback on extended writing in GCSE science papers

- Poorly answered across tiers and sciences
- Approx 16% ‘not attempted’ on foundation tier
- Students were not:
  - using precise scientific language
  - making relevant comments
  - understanding the command words explain, compare , evaluate
  - Understanding the science associated with the question

Advice for teachers:

- Remind students to **plan** before answering, use scientific detail, and ensure all parts of the question are addressed.
- Teach **command words** and the structure of levels-of-response mark schemes using exemplar answers and mark schemes.
- Encourage concise, precise writing rather than filling space with repeated or irrelevant content.
- **Model** how to avoid common pitfalls, such as repeating question stems, failing to address all aspects, or ignoring key terminology.

Command words

- Balance: Write a balanced chemical equation.
- Calculate: Use provided data to work out an answer.
- Compare: Write similarities and/or differences between items, not just about one.
- Complete: Fill in blanks (e.g. tables, diagrams, sentences).
- Define: State the meaning of a term.
- Describe: Recall and set out facts, processes, or events accurately.
- Design: Outline how something should be done.
- Plan: Write a method for investigation.
- Plot: Put points on a graph using given data.
- Predict: State a possible outcome.
- Show: Provide evidence to reach a conclusion.
- Determine: Use given data/information to find an answer.
- Evaluate: Use evidence and knowledge to make a judgement, considering pros and cons.
- Explain: Make something clear by stating reasons for it.
- Give/Name: Provide a short factual answer (word, phrase, or sentence).
- Identify: Name or otherwise characterise an item.
- Justify: Use evidence to support your answer.
- Label: Name parts of a diagram.
- Measure: Find a value for a given quantity.
- Suggest: Apply knowledge to a new situation.
- Use: The answer must use provided information.

Writing a scientific method

Pupils can be asked to design a scientific method that produces valid results. A method must focus on controlling variables, ensuring measurements are repeatable and reproducible, achieving precision and accuracy, and avoiding sources of error.

What challenges could this present for pupils in terms of literacy?

How could you support pupils to write a valid method?

BUG the text

- B: Box the command word
  - Students put a box around the command word in the question (such as 'describe', 'explain', 'evaluate'). This highlights what type of answer is required and focuses their attention on the key action.
- U: Underline key words
  - Underlining the key words in the question helps to jog memory about relevant topics, important details, and scientific concepts that need to be addressed.
- G: Glance back
  - Finally, students glance over the whole question again to check if all important elements have been addressed, ensuring their response is complete before moving on.

Try this for the past paper question provided.

Core components of science literacy:
Talk, dialogue and critical thinking

- Talk and Dialogue: Discussion and oral presentations help learners clarify ideas and rehearse scientific reasoning. Talk is central to meaning-making in science lessons.
- Critical Thinking: Evaluating sources, comparing claims, and distinguishing between evidence-based reasoning and opinion are core elements of science literacy.

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